

# Data Evaluation Report on the Acute Toxicity of Dithiopyr to Aquatic Vascular Plants (*Lemna gibba*)

PMRA Submission Number {.....}

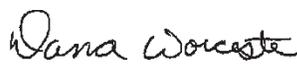
EPA MRID Number 49760107

**Data Requirement:** PMRA DATA CODE {.....}  
EPA DP Barcode 431654  
OECD Data Point {.....}  
EPA MRID 49760107  
EPA Guideline 850.4400

**Test material:** Dithiopyr **Purity:** 94.9%  
**Common name:** Dithiopyr  
**Chemical name:** IUPAC:  
CAS name: 3,4-Pyridinecarbothioic acid, (2-difluoromethyl)-4-(2-methylpropyl)-6-(trifluoromethyl)-S-S-dimethyl ester

CAS No.:  
Synonyms: TSN309345

**Primary Reviewer:** Dana Worcester  
**Environmental Scientist, CDM/CSS-Dynamac JV**

**Signature:**   
**Date:** 2/27/2017

**Secondary Reviewer:** John Marton, Ph.D.  
**Environmental Scientist, CDM/CSS-Dynamac JV**

**Signature:**   
**Date:** 3/24/2017

**Primary Reviewer:**  
Jennifer Connolly **Date:** 11/22/17  
**GIS Biologist, EPA/OPP/EFED/EISB**

**JENNIFER CONNOLLY** Digitally signed by JENNIFER CONNOLLY  
Date: 2018.06.13 19:01:17 -04'00'

**Secondary Reviewer(s):** Kristina Garber **Date:** 6/6/18  
**EPA/OPP/EFED/ERB1**

**KRISTINA GARBER** Digitally signed by KRISTINA GARBER  
Date: 2018.06.13 13:40:07 -04'00'

*This Data Evaluation Record may have been altered by the Environmental Fate and Effects Division subsequent to signing by CDM/CSS-Dynamac JV personnel*

**Reference/Submission No.:** {.....}

**Company Code** {.....} [For PMRA]  
**Active Code** {.....} [For PMRA]  
**Use Site Category:** {.....} [For PMRA]  
**EPA PC Code** 128994

**Date Evaluation Completed:** 6/6/18

**CITATION:** Arnie, J.R., L.A. Lockard, J.R. Porch and K.H. Martin. Dithiopyr TGAI: A 7-Day Static-Renewal Toxicity Test with Duckweed (*Lemna Gibba* G3). Unpublished study performed by Wildlife International, Ltd., Easton, Maryland. Laboratory Project Number: 379P-112. Study sponsored by Dow AgroSciences, LLC, Indianapolis, Indiana. Study completed October 15, 2015.

**DISCLAIMER:** This document provides guidance for EPA and PMRA reviewers on how to complete a data evaluation record after reviewing a scientific study concerning the acute toxicity of a pesticide to aquatic vascular plants. It is not intended to prescribe conditions to any external party for conducting this study nor to establish absolute criteria regarding the assessment of whether the study is scientifically sound and whether the study satisfies any applicable data requirements. Reviewers are expected to review and to determine for each study, on a case-by-case basis, whether it is scientifically sound and provides sufficient information to satisfy applicable data requirements. Studies that fail to meet any of the conditions may be accepted, if appropriate; similarly, studies that meet all of the conditions may be rejected, if appropriate. In sum, the reviewer is to take into account the totality of

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factors related to the test methodology and results in determining the acceptability of the study.

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## EXECUTIVE SUMMARY:

In a 7-day acute toxicity study, the freshwater floating aquatic vascular plants (duckweed, *Lemna gibba*) were exposed to dithiopyr at nominal concentrations of 0 (negative control), 0.3, 0.95, 3.1, 9.8, 31 and 100 µg/L. The time-weighted average concentrations were <0.0000225 (<LOQ; control), 0.28, 0.75, 2.4, 7.5, 25 and 76 µg ai/L. No solvent was used in this study. The test substance declined substantially during the study. Measured concentrations of old solutions ranging from 67-78%, 73-100%, and 60-87% of their freshly prepared counterparts at Days 3, 5, and 7, respectively.

NOAEC values for all endpoints (frond number, frond growth rate, final biomass, and biomass growth rate) were 2.67 µg ai/L. IC<sub>50</sub> values for frond number, frond growth rate, final biomass, and biomass growth rate were 6.11, 15.6, 36.1 and 524 µg ai/L, respectively. The % growth inhibition of frond number in the treated culture as compared to the control ranged was -9.5 to 86%.

Fronds exposed in the lowest two treatment levels and the controls were observed to be normal at 7 days. At 7 days, fronds of the plants in the 2.67-80.9µg ai/L concentrations were curled.

This study is **scientifically sound** and is classified as **acceptable**.

## Results Synopsis

Test Organism: Duckweed, *Lemna gibba*

Test Type (Flow-through, Static, Static Renewal): Static Renewal

Note: N/A = not available

### *Frond number*

IC <sub>05</sub> :	1.64 µg ai/L	95% C.I.: 0 to 2.41 µg ai/L
IC <sub>50</sub> :	6.11 µg ai/L	95% C.I.: 4.98 to 7.5 µg ai/L
NOAEC:	2.67 µg ai/L	
Probit Slope:	N/A	

### *Frond growth rate*

IC <sub>05</sub> :	1.08 µg ai/L	95% C.I.: 0.438 to 1.7 µg ai/L
IC <sub>50</sub> :	15.6 µg ai/L	95% C.I.: 12.9 to 18.8 µg ai/L
NOAEC:	2.67 µg ai/L	
Probit Slope:	N/A	

### *Biomass yield*

IC <sub>05</sub> :	0.641 µg ai/L	95% C.I.: 0 to 1.76 µg ai/L
IC <sub>50</sub> :	36.1 µg ai/L	95% C.I.: 22.8 to 57.3 µg ai/L
NOAEC:	2.67 µg ai/L	
Probit Slope:	N/A	

### *Biomass growth rate*

IC <sub>05</sub> :	1.54 µg ai/L	95% C.I.: 0.502 to 3.18 µg ai/L
IC <sub>50</sub> :	524 µg ai/L	95% C.I.: 198 to 1390 µg ai/L
NOAEC:	2.67 µg ai/L	
Probit Slope:	N/A	

Endpoint(s) Affected: Frond number, frond growth rate, final biomass, and biomass growth rate

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## I. MATERIALS AND METHODS

**GUIDELINE FOLLOWED:** This study was designed to comply with U.S. EPA OPP 122-2 and 123-2 and U.S. EPA OCSPP 850.4400 guidelines. The following deviations from the U.S. EPA OCSPP 850.4400 (2012) guideline are noted:

1. The test concentrations declined substantially during the study with measured concentrations of old solutions ranging from 67-78%, 73-100%, and 60-87% of their freshly prepared counterparts at Days 3, 5, and 7, respectively.
2. The physico-chemical properties of the test material were not reported.

These deviations do not affect the validity of the study.

**COMPLIANCE:** Signed and dated GLP, Quality Assurance and No Data Confidentiality statements were provided. The study was conducted in compliance with the GLP standards of the OECD GLP.

### **A. MATERIALS:**

**1. Test material** Dithiopyr technical

**Description:** Solid

**Lot No./Batch No.:** 1A08164B01

**Purity:** 94.9%

**Stability of compound under test conditions:** . The measured concentrations of old solutions ranged from 67-78%, 73-100%, and 60-87% of their freshly prepared counterparts at Days 3, 5, and 7, respectively. See reviewers comments

*(OECD recommends water solubility, stability in water and light, pKa, Pow, and vapor pressure of test compound)*

**Storage conditions of test chemicals:** In the dark under ambient conditions.

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**Physicochemical properties of Dithiopyr.**

Parameter	Values	Comments
Water solubility	Not reported	
Vapor pressure	Not reported	
UV absorption	Not reported	
pKa	Not reported	
Kow	Not reported	

**2. Test organism:**

**Name:** Duckweed, *Lemna gibba* EPA requires a vascular species: *Lemna gibba*.

**Strain, if provided:** G3

**Source:** In-house cultures originally obtained from US Department of Agriculture.

**Age of inoculum:** Actively growing for least two weeks

**Method of cultivation:** 24 hours of light.

**B. STUDY DESIGN:**

**1. Experimental Conditions**

- a. Range-finding study: A preliminary test was conducted using a control and nominal concentrations of 0.1, 1, 100 and 1000 µg ai/L. The initial frond number was 12. After 7 days, mean frond yield inhibition was 3, 8, 61 and 86% for the 0.1, 1, 100 and 1000 µg ai/L test levels, respectively.
- b. Definitive Study

**Table 1: Experimental Parameters**

Parameter	Details	Remarks
		Criteria
Acclimation period:	Plants were cultured for at least 2 weeks under test conditions.	
Culturing media and conditions: (same as test or not)	Same as test	
Health: (any mortality observed)	None reported	
<u>Test system</u> Static/static renewal	Static renewal	
Renewal rate for static renewal	Renewed on days 3 and 5	<i>EPA expects the test concentrations to be renewed every 3 to 4 days (one renewal for the 7 day test, 3-4 renewals for the 14 day test).</i>

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Parameter	Details	Remarks
		<i>Criteria</i>
Incubation facility	Growth chamber	
Duration of the test	7 days	<i>EPA requires a duration of 14 days. Seven day studies will be accepted for review by the Agency.</i>
<u>Test vessel</u> Material: ( <i>glass/stainless steel</i> ) Size: Fill volume:	Glass beaker 250 mL 100 mL	
<u>Details of 20X AAP medium</u> pH in new solutions: pH in old solutions: Chelator used: Carbon source:	7.8-8.3 8.6-9.1 Na <sub>2</sub> EDTAx2H <sub>2</sub> O NaHCO <sub>3</sub>	<i>EPA recommends the following culture media: Modified Hoagland's E+ or 20X-AAP. Chelating agents (e.g. EDTA) are recommended in the nutrient medium for optimum cell growth. Lower concentrations of chelating agents (down to one-third of the normal concentration recommended for AAP medium) may be used in the nutrient medium used for test solution preparation if it is suspected that the chelator will interact with the test material. ASTM reference, E1415-91 and D 3978-80 (reapproved 1987).</i>
If non-standard nutrient medium was used, detailed composition provided (Yes/No)	A standard medium was used. A detailed composition was provided.	
<u>Dilution water</u> source/type: pH:	Wildlife International, Ltd. well water	Water analyses were performed on samples collected on 26 December 2014.

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Parameter	Details	Remarks
		<i>Criteria</i>
water pretreatment (if any): Total Organic Carbon: particulate matter: metals: pesticides: chlorine:	Not reported Purified (NANOpure water) Not reported Not reported Below detection limits Not reported	<i>EPA recommends a pH of ~5.0. A solution pH of 7.5 is acceptable if type 20X-AAP nutrient media is used.</i>
Indicate how the test material is added to the medium (added directly or used stock solution)	A primary stock solution was prepared by dissolving 0.0100 g of the test substance in acetonitrile to achieve a nominal concentration of 100 µg ai/mL. Five additional stock solutions were prepared serial dilutions.  The test solutions were prepared by adding 500 µL of each stock to a 500 mL glass volumetric flask, evaporating the solvent under a stream of nitrogen. After the solvent evaporated 20X AAP medium was added.	
Aeration or agitation	None	
<u>Sediment used (for rooted aquatic vascular plants)</u> Origin: Textural classification (%sand, silt, and clay): Organic carbon (%): Geographic location:	N/A	
<u>Number of replicates</u> Negative control: Solvent control: Treatments:	4 N/A 4	
Number of plants/replicate	4 plants/replicate	<i>EPA requires 5 plants.</i>
Number of fronds/plant	3 fronds/plant (12 fronds total per	

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Parameter	Details	Remarks
		Criteria
	replicate)	<i>EPA requires 3 fronds per plant.</i>
<u>Test concentrations</u> Nominal ai:  Time-weighted average:	0 (negative control), 0.30, 0.95, 3.1, 9.8, 31, and 100 µg ai/L  <0.000025 (negative control), 0.28, 0.75, 2.4, 7.5, 25 and 76 µg ai/L	<i>EPA requires at least 5 test concentrations with a dose range of 2X or 3X progression.</i>
Solvent (type, percentage, if used)	N/A	
Method and interval of analytical verification	The test concentrations were measured at the start of exposure on Days 0, 3 and 5 and at the end of the exposure on Day 7 using HPLC.	
<u>Test conditions</u> Temperature: Photoperiod: Light intensity and quality:	24.52-25.27°C Continuous 4690-5420 lux cool white fluorescent light	
<u>Reference chemical (if used) name:</u> concentrations:	N/A	
Other parameters, if any	N/A	

**2. Observations:**

**Table 2: Observation parameters**

Parameters	Details	Remarks/Criteria
Parameters measured (e.g.: number of fronds, plant dry weight or other toxicity symptoms)	Frond number Frond growth rate Biomass	
Measurement technique for frond number and other end points	Frond number was determined by direct counting. Plants were dried at 60°C for at least 48 hours. Growth rates were calculated using logarithmic growth equations.	

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Parameters	Details	Remarks/Criteria
Observation intervals	Fronds were counted on days 0, 3, 5, and 7.	
Other observations, if any	Observations of change in color, break-up of plants and destructions of roots were made on every determination day and at the end of the test.	
Indicate whether there was an exponential growth in the control	Yes, the doubling time in the negative control was 1.9 days.	The reviewer calculated the doubling time of the negative control as $\ln(2)/0.3654$ , 0.3654 is the 0-7 day frond growth rate of the negative control.
Were raw data included?	Yes	

## II. RESULTS and DISCUSSION:

### A. INHIBITORY EFFECTS:

After 7 days, the mean frond number of the negative control was 156 fronds/replicate, yielding inhibitions relative to the negative control of 1.61, -9.47, 9.95, 61.6, 82.3 and 85.6% in the time zero fresh 0.284, 0.793, 2.67, 8.35, 27.3, and 80.9 µg ai/L treatment levels, respectively. The study author did not determine NOAEC and IC<sub>50</sub> values based on 7-day frond number.

The mean 0-7-day frond growth rate of the negative control was 0.365380/day, yielding inhibitions relative to the negative control of 1, -4, 4, 38, 68, and 75% in the time zero fresh 0.284, 0.793, 2.67, 8.35, 27.3, and 80.9 µg ai/L treatment levels, respectively. The NOAEC value reported by the study author based on 7-day frond growth rate was 2.4 µg ai/L, in terms of time-weighted average concentrations; the IC<sub>50</sub> value was 14 µg ai/L.

The mean 0-7-day frond number of the negative control was 144 fronds, yielding inhibitions relative to the negative control of 2, -10, 11, 67, 89, and 93% in the time zero fresh 0.284, 0.793, 2.67, 8.35, 27.3, and 80.9 µg ai/L treatment levels, respectively. The NOAEC value reported by the study author based on 7-day frond number was 2.4 µg ai/L, in terms of time-weighted average concentrations; the IC<sub>50</sub> value was 5.3 µg ai/L.

After 7 days, the mean biomass of the negative control was 22.425 mg, yielding inhibitions relative to the negative control of -2, -12, 3, 32, 42, and 50% in the time zero fresh 0.284, 0.793, 2.67, 8.35, 27.3, and 80.9 µg ai/L treatment levels, respectively. The study author did not determine NOAEC and IC<sub>50</sub> values based on 7-day biomass.

The mean 0-7-day biomass yield of the negative control was 20.93 mg, yielding inhibitions relative to the negative control of -2, -13, 3, 35, 45, and 53% in the time zero fresh 0.284, 0.793, 2.67, 8.35, 27.3, and 80.9 µg ai/L treatment levels, respectively. The NOAEC value reported by the study author based on 7-day biomass yield was 2.4 µg ai/L, in terms of time-weighted average concentrations; the IC<sub>50</sub> value was 36 µg ai/L.

The mean 0-7 day biomass growth rate of the negative control was 0.385887/day, yielding inhibitions relative to the negative control of -1, -4, 1, 15, 20, and 25% in the time zero fresh 0.284, 0.793, 2.67, 8.35, 27.3, and 80.9 µg ai/L treatment levels, respectively. The NOAEC value reported by the study author based on 7 day biomass

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growth rate was 2.4 µg ai/L, in terms of time-weighted average concentrations; the IC<sub>50</sub> value was >77 µg ai/L.

Fronds exposed in the lowest two treatment levels and the controls were observed to be normal at 7 days. At 7 days, fronds of the plants in the 2.4 to 77 µg ai/L concentrations were curled.

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**Table 3: Measured concentrations of Dithiopyr (frond number of duckweed, *Lemna gibba*)**

Time zero and [nominal] concentrations µg ai/L	Measured Concentrations					
	Day 0 (new)	Day 3 (new)	Day 3 (old)	Day 5 (new)	Day 5 (old)	Day 7 (old)
Negative control	<LOQ	<LOQ	0.0627	<LOQ	0.0665	0.0365
0.284 [0.30]	0.284	0.267	0.222	0.422	0.222	0.255
0.793 [0.95]	0.793	0.812	0.531	0.997	0.747	0.723
2.67 [3.1]	2.67	2.44	1.79	2.93	2.44	2.37
8.35 [9.8]	8.35	7.48	5.76	9.33	6.95	7.59
27.3 [31]	27.3	30.1	19.1	28.5	22.0	24.6
80.9 [100]	80.9	84.5	58.8	91.5	69.8	79.2

**Table 3: Effect of Dithiopyr on frond number of duckweed, *Lemna gibba***

Time zero and [nominal] concentrations µg ai/L	Initial frond number/te st solution	frond number at			
		3 days	5 days	7 days	
				frond number	% inhibition <sup>a</sup>
Negative control	12	31	69	156	N/A
0.284 [0.30]	12	29	67	153	1.6
0.793 [0.95]	12	29	78	171	-9.5
2.67 [3.1]	12	28	64	140	9.95
8.35 [9.8]	12	23	38	60	61.6
27.3 [31]	12	22	26	28	82.3
80.9 [100]	12	21	22	23	85.6
Reference chemical (if used)	N/A				

<sup>a</sup> Calculated by the reviewer relative to the negative control.

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**Table 4: Effect of Dithiopyr on frond number of duckweed, *Lemna gibba***

Time zero and [nominal] concentrations µg ai/L	Initial frond number/test solution (or other endpoint)	Frond growth rate (day <sup>-1</sup> )		Frond number	
		0-7 days	% inhibition	0-7 days	% inhibition
Negative control	12	0.0365380	N/A	144	N/A
0.284 [0.30]	12	0.363049	1	141	2
0.793 [0.95]	12	0.378843	-4	159	-10
2.67 [3.1]	12	0.349334	4	128	11
8.35 [9.8]	12	0.227394	38	48	67
27.3 [31]	12	0.117876	68	16	89
80.9 [100]	12	0.089625	75	11	93

**Table 5: Effect of Dithiopyr on biomass of duckweed, *Lemna gibba***

Time zero and [nominal] concentrations µg ai/L	Initial frond weight/test solution (mg)	Final biomass (mg)		Biomass yield (mg)		Biomass growth rate (day <sup>-1</sup> )	
		Day 7	% inhibition <sup>a</sup>	0-7 days	% inhibition	0-7 days	% inhibition
Negative control	1.5	22.4	N/A	20.9	N/A	0.385887	N/A
0.284 [0.30]	1.5	22.9	-2	21.4	-2	0.388872	-1
0.793 [0.95]	1.5	25.1	-12	23.6	-13	0.402102	-4
2.67 [3.1]	1.5	21.8	3	20.3	3	0.380612	1
8.35 [9.8]	1.5	15.2	32	13.7	35	0.329635	15
27.3 [31]	1.5	13.0	42	11.5	45	0.308388	20
80.9 [100]	1.5	11.3	50	9.8	53	0.287505	25

<sup>a</sup> Calculated by the reviewer relative to the negative control.

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**Table 6: Statistical endpoint values.\* (calculated by the study author based on geometric, mean measured concentrations compared to negative control)**

Statistical Endpoint	Frond number	Frond growth rate	Biomass yield	Biomass growth rate
NOAEC (µg ai/L)	2.4	2.4	2.4	2.4
LOAEC (µg ai/L)	7.5	7.5	7.5	7.5
IC <sub>50</sub> or EC <sub>50</sub> (95% C.I.) (µg ai/L)	5.3 (3.3 to 8.3)	14 (10 to 19)	36 (20 to 65)	>77 (N/A)
Reference chemical, (mg/L) NOAEC IC <sub>50</sub> /EC <sub>50</sub>	N/A	N/A	N/A	N/A

\* Do not use this table, if the study was deemed unacceptable.

N/A. Not applicable.

**B. REPORTED STATISTICS:**

The study author statistically analyzed the endpoints for mean growth rates and yield using SAS (9.4). NOAEC and LOAEC were determined using Dunnett's test.

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## C. VERIFICATION OF STATISTICAL RESULTS:

Statistical Method: The reviewer assessed the endpoints for frond number, frond growth rate, biomass yield, and biomass growth rate using CETIS version 1.8.7.12 statistical software using backend database settings implemented by EFED on 10/20/15. Frond growth rate, biomass yield, and biomass growth rate data were confirmed to be normally distributed and have homogeneous variances using Shapiro-Wilk's and Bartlett's tests, respectively, and the data were therefore analyzed using William's tests. Frond number data had normal distribution but unequal variances and were analyzed using Jonckheere-Terpstra test. The ICx values were calculated using Bruce-Versteeg regression. All toxicity values are reported in terms of time-weighted average concentrations.

### *Frond number*

IC <sub>05</sub> :	0.64 µg ai/L	95% C.I.: 0 to 2.41 µg ai/L
IC <sub>50</sub> :	6.11 µg ai/L	95% C.I.: 4.98 to 7.5 µg ai/L
NOAEC:	2.67 µg ai/L	
Probit Slope:	N/A	

### *Frond growth rate*

IC <sub>05</sub> :	1.08 µg ai/L	95% C.I.: 0.438 to 1.7 µg ai/L
IC <sub>50</sub> :	15.6 µg ai/L	95% C.I.: 12.9 to 18.8 µg ai/L
NOAEC:	2.67 µg ai/L	
Probit Slope:	N/A	

### *Biomass yield*

IC <sub>05</sub> :	0.641 µg ai/L	95% C.I.: 0 to 1.76 µg ai/L
IC <sub>50</sub> :	36.1 µg ai/L	95% C.I.: 22.8 to 57.3 µg ai/L
NOAEC:	2.67 µg ai/L	
Probit Slope:	N/A	

### *Biomass growth rate*

IC <sub>05</sub> :	1.54 µg ai/L	95% C.I.: 0.502 to 3.18 µg ai/L
IC <sub>50</sub> :	524 µg ai/L	95% C.I.: 198 to 1390 µg ai/L
NOAEC:	2.67 µg ai/L	
Probit Slope:	N/A	

## D. STUDY DEFICIENCIES:

Though minor deviations were noted above, there were no major deviations that would impact the acceptability of this study.

## E. REVIEWER'S COMMENTS:

The reviewer's results were in agreement with those of the study author. The reviewer's results were based on the time-weighted average concentrations, whereas the study author based results on geometric mean-measured concentrations. The reviewer's results are presented in the Executive Summary and Conclusions sections of this report.

As part of the stock solution preparation, the test material was dissolved in acetonitrile, which was evaporated off. Saltwater algal medium was added to complete the stock solutions. The study authors indicated that this procedure was carried out to increase accuracy associated with test concentrations and in order to avoid the use of a solvent in the test. Similar approaches have been attempted in sediment toxicity studies with invertebrates. There is uncertainty associated with the addition of acetonitrile to the stock solutions, as this was not incorporated into the controls. This approach assumes that acetonitrile is completely evaporated prior to addition of the

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saltwater medium and so algae are not exposed to acetonitrile.

Dithiopyr was detected on day 3, 5 and 7 at 0.0627 ug a.i./L, 0.0665 ug a.i./L and 0.0365 ug a.i./L, respectively, in the old controls. Since the validity criteria were met, and the concentration was 4-7 orders of magnitude below the test levels, it was assumed that this low level of contamination did not impact the validity of the study.

Since this compound has a Koc ranging 1396-3049, and the chemical is stable due to hydrolysis, photolysis half-lives are on the order of weeks and aerobic soil metabolism half-lives are >1 year (based on information in the registration review problem formulation), it is the reviewer's opinion that the lack of stability of the compound in the test vessels is due to sorption, not degradation.

Due to high analytical variability, the reviewer calculated the time-weighted average concentrations using the following equation:

$$\frac{C_0 \left( \frac{T_1 - T_0}{2} \right) + C_{1i} \left( \frac{T_1 - T_0}{2} \right) + C_{1ii} \left( \frac{T_2 - T_1}{2} \right) + C_2 \left( \frac{T_2 - T_1}{2} \right)}{T_2}$$

Where T0, T1, etc are the times at which sampling occurred.

Renewal only occurred at T1. C1i is the concentration measured immediately before renewal and C1ii is the concentration measured immediately after renewal (essentially taken at the same time point).

The laboratory portion of the definitive test was conducted from May 15 to May 22, 2015.

## F. CONCLUSIONS:

This study is **scientifically sound** and is classified as **acceptable**. After 7 days, the most sensitive endpoint was frond number with IC<sub>50</sub> and NOAEC values of 2.67 and 6.11 µg ai/L, respectively, based on time-weighted average concentrations.

### *Frond number*

IC <sub>05</sub> :	0.64 µg ai/L	95% C.I.: 0 to 2.41 µg ai/L
IC <sub>50</sub> :	6.11 µg ai/L	95% C.I.: 4.98 to 7.5 µg ai/L
NOAEC:	2.67 µg ai/L	
Probit Slope:	N/A	

### *Frond growth rate*

IC <sub>05</sub> :	1.08 µg ai/L	95% C.I.: 0.438 to 1.7 µg ai/L
IC <sub>50</sub> :	15.6 µg ai/L	95% C.I.: 12.9 to 18.8 µg ai/L
NOAEC:	2.67 µg ai/L	
Probit Slope:	N/A	

### *Biomass yield*

IC <sub>05</sub> :	0.641 µg ai/L	95% C.I.: 0 to 1.76 µg ai/L
IC <sub>50</sub> :	36.1 µg ai/L	95% C.I.: 22.8 to 57.3 µg ai/L
NOAEC:	2.67 µg ai/L	
Probit Slope:	N/A	

### *Biomass growth rate*

IC <sub>05</sub> :	1.54 µg ai/L	95% C.I.: 0.502 to 3.18 µg ai/L
IC <sub>50</sub> :	524 µg ai/L	95% C.I.: 198 to 1390 µg ai/L

## Data Evaluation Report on the Acute Toxicity of Dithiopyr to Aquatic Vascular Plants (*Lemna gibba*)

PMRA Submission Number {.....}

EPA MRID Number 49760107

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NOAEC: 2.67 µg ai/L

Probit Slope: N/A

Endpoint(s) Affected: Frond number, frond growth rate, final biomass, and biomass growth rate

### **III. REFERENCES:**

1. U.S. Environmental Protection Agency. 2012. *Series 850-Ecological Effects Test Guidelines, OCSPP Number 850.4400: Aquatic Plant Toxicity Test Using Lemna spp.*
2. Organization for Economic Cooperation and Development. 2006. OECD Guidelines for Testing of Chemicals, Guideline 221: *Lemna sp.* Growth Inhibition Test. Adopted 23 March 2006.
3. American Society for Testing and Materials. 1991. ASTM Standard Guide 1415-91E: Standard Guide for Conducting Static Toxicity Tests with *Lemna gibba* G3.
4. Microsoft Corporation, Microsoft Excel 2010. Copyright 1985-2010.
5. The SAS System for Windows. 2002 — 2014. Version 9.4. SAS Institute Inc., Cary, North Carolina.
6. Bruce, Robert D. and Donald J. Versteeg. 1992. A Statistical Procedure for Modeling Continuous Toxicity Data. *Environmental Toxicology and Chemistry*. 11: 1485-1494.

OCSPP 850.4400 Aquatic Vascular Plant

Wildlife International

<b>Analysis ID:</b> 04-0461-3971	<b>Endpoint:</b> Frond Number Growth Rate	<b>CETIS Version:</b> CETISv1.8.7
<b>Analyzed:</b> 04 Mar-17 6:16	<b>Analysis:</b> Parametric-Control vs Treatments	<b>Official Results:</b> Yes
<b>Batch ID:</b> 03-2473-9344	<b>Test Type:</b> Lemna Growth (7-d)	<b>Analyst:</b>
<b>Start Date:</b> 15 May-15	<b>Protocol:</b> OCSPP 850.4400 Aquatic Plant (Lemna)	<b>Diluent:</b> Algal Culture Media
<b>Ending Date:</b>	<b>Species:</b> Lemna Gibba	<b>Brine:</b>
<b>Duration:</b> NA	<b>Source:</b> US Dept. Agri.	<b>Age:</b>

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	8.87%	2.67	8.35	4.722	

Dunnett Multiple Comparison Test

Control	vs	C-µg ai/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.284	0.176	2.45	0.032	6	0.8042	CDF	Non-Significant Effect
		0.793	-1.02	2.45	0.032	6	0.9879	CDF	Non-Significant Effect
		2.67	1.21	2.45	0.032	6	0.3605	CDF	Non-Significant Effect
		8.35*	10.4	2.45	0.032	6	<0.0001	CDF	Significant Effect
		27.3*	18.7	2.45	0.032	6	<0.0001	CDF	Significant Effect
		80.9*	20.8	2.45	0.032	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.3735529	0.06225882	6	178	<0.0001	Significant Effect
Error	0.007365749	0.00035075	21			
Total	0.3809187		27			

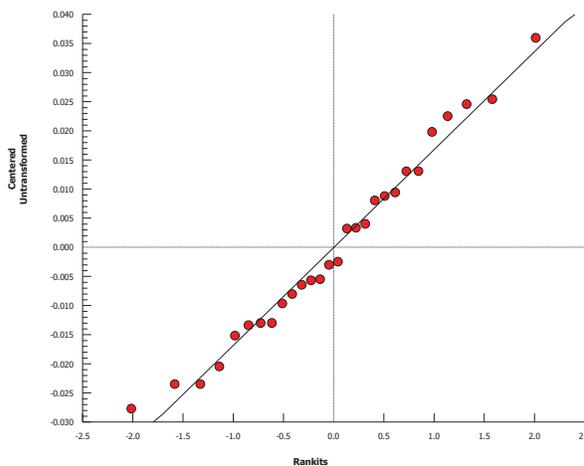
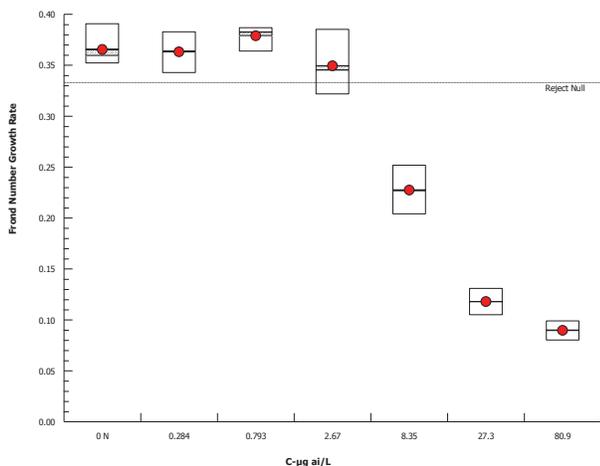
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.59	16.8	0.4712	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.975	0.897	0.7178	Normal Distribution

Frond Number Growth Rate Summary

C-µg ai/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.365	0.338	0.393	0.359	0.352	0.391	0.00865	4.73%	0.0%
0.284		4	0.363	0.335	0.391	0.363	0.343	0.383	0.00891	4.91%	0.64%
0.793		4	0.379	0.362	0.395	0.382	0.364	0.387	0.00517	2.73%	-3.68%
2.67		4	0.349	0.307	0.391	0.345	0.322	0.385	0.0132	7.57%	4.39%
8.35		4	0.227	0.184	0.271	0.227	0.204	0.252	0.0136	11.9%	37.8%
27.3		4	0.118	0.0939	0.142	0.118	0.105	0.131	0.00752	12.8%	67.7%
80.9		4	0.0896	0.0766	0.103	0.0898	0.0799	0.099	0.0041	9.16%	75.5%

Graphics



OCSPP 850.4400 Aquatic Vascular Plant

Wildlife International

<b>Analysis ID:</b> 03-9920-3164	<b>Endpoint:</b> Frond Number Growth Rate	<b>CETIS Version:</b> CETISv1.8.7
<b>Analyzed:</b> 04 Mar-17 6:16	<b>Analysis:</b> Parametric-Control vs Ord.Treatments	<b>Official Results:</b> Yes
<b>Batch ID:</b> 03-2473-9344	<b>Test Type:</b> Lemna Growth (7-d)	<b>Analyst:</b>
<b>Start Date:</b> 15 May-15	<b>Protocol:</b> OCSPP 850.4400 Aquatic Plant (Lemna)	<b>Diluent:</b> Algal Culture Media
<b>Ending Date:</b>	<b>Species:</b> Lemna Gibba	<b>Brine:</b>
<b>Duration:</b> NA	<b>Source:</b> US Dept. Agri.	<b>Age:</b>

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	6.72%	2.67	8.35	4.722	

Williams Multiple Comparison Test

Control	vs	C-µg ai/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.284	0.176	1.72	0.023	6	>0.05	CDF	Non-Significant Effect
		0.793	-0.42	1.8	0.024	6	>0.05	CDF	Non-Significant Effect
		2.67	1.21	1.83	0.024	6	>0.05	CDF	Non-Significant Effect
		8.35*	10.4	1.84	0.024	6	<0.05	CDF	Significant Effect
		27.3*	18.7	1.85	0.025	6	<0.05	CDF	Significant Effect
		80.9*	20.8	1.86	0.025	6	<0.05	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.3735529	0.06225882	6	178	<0.0001	Significant Effect
Error	0.007365749	0.00035075	21			
Total	0.3809187		27			

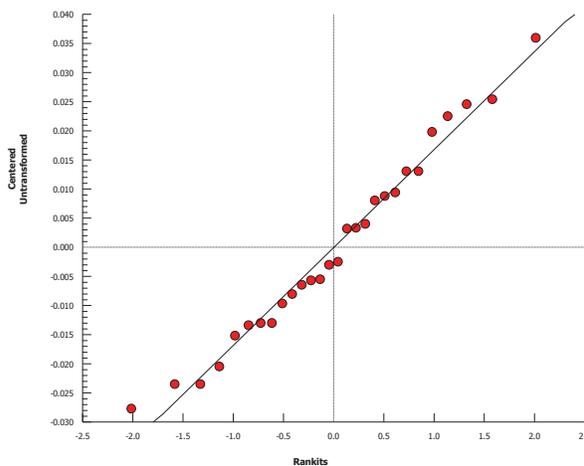
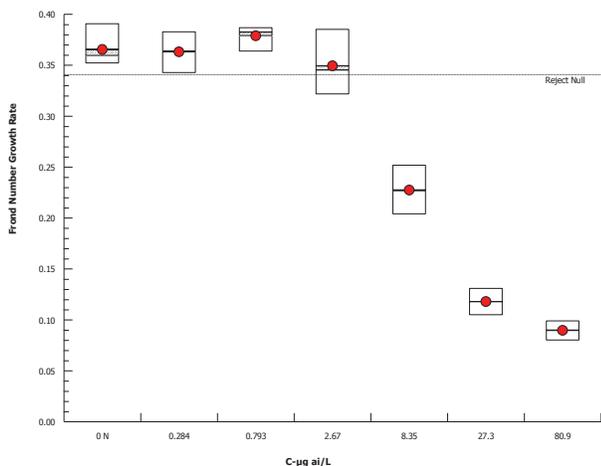
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.59	16.8	0.4712	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.975	0.897	0.7178	Normal Distribution

Frond Number Growth Rate Summary

C-µg ai/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.365	0.338	0.393	0.359	0.352	0.391	0.00865	4.73%	0.0%
0.284		4	0.363	0.335	0.391	0.363	0.343	0.383	0.00891	4.91%	0.64%
0.793		4	0.379	0.362	0.395	0.382	0.364	0.387	0.00517	2.73%	-3.68%
2.67		4	0.349	0.307	0.391	0.345	0.322	0.385	0.0132	7.57%	4.39%
8.35		4	0.227	0.184	0.271	0.227	0.204	0.252	0.0136	11.9%	37.8%
27.3		4	0.118	0.0939	0.142	0.118	0.105	0.131	0.00752	12.8%	67.7%
80.9		4	0.0896	0.0766	0.103	0.0898	0.0799	0.099	0.0041	9.16%	75.5%

Graphics



OCSPP 850.4400 Aquatic Vascular Plant

Wildlife International

<b>Analysis ID:</b> 12-1288-8000	<b>Endpoint:</b> Frond Number	<b>CETIS Version:</b> CETISv1.8.7
<b>Analyzed:</b> 04 Mar-17 6:16	<b>Analysis:</b> Nonparametric-Two Sample	<b>Official Results:</b> Yes
<b>Batch ID:</b> 03-2473-9344	<b>Test Type:</b> Lemna Growth (7-d)	<b>Analyst:</b>
<b>Start Date:</b> 15 May-15	<b>Protocol:</b> OCSPP 850.4400 Aquatic Plant (Lemna)	<b>Diluent:</b> Algal Culture Media
<b>Ending Date:</b>	<b>Species:</b> Lemna Gibba	<b>Brine:</b>
<b>Duration:</b> NA	<b>Source:</b> US Dept. Agri.	<b>Age:</b>

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	15.2%	2.67	8.35	4.722	

Mann-Whitney U Two-Sample Test

Control	vs	C-µg ai/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.284	9	NA	0	6	0.4429	Exact	Non-Significant Effect
		0.793	4	NA	0	6	0.9000	Exact	Non-Significant Effect
		2.67	13	NA	0	6	0.1000	Exact	Non-Significant Effect
		8.35*	16	NA	0	6	0.0143	Exact	Significant Effect
		27.3*	16	NA	0	6	0.0143	Exact	Significant Effect
		80.9*	16	NA	0	6	0.0143	Exact	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	101168.7	16861.45	6	66.9	<0.0001	Significant Effect
Error	5290	251.9048	21			
Total	106458.7		27			

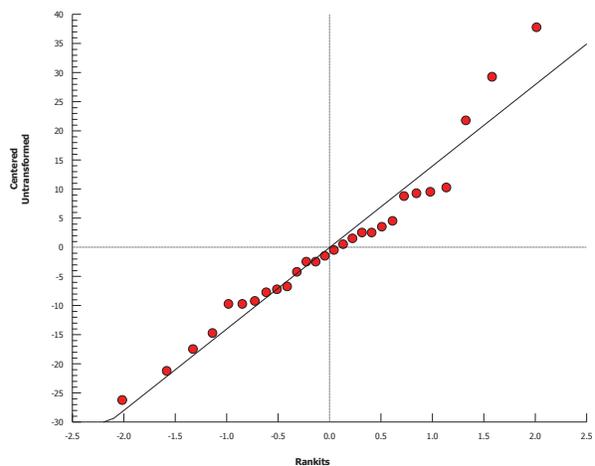
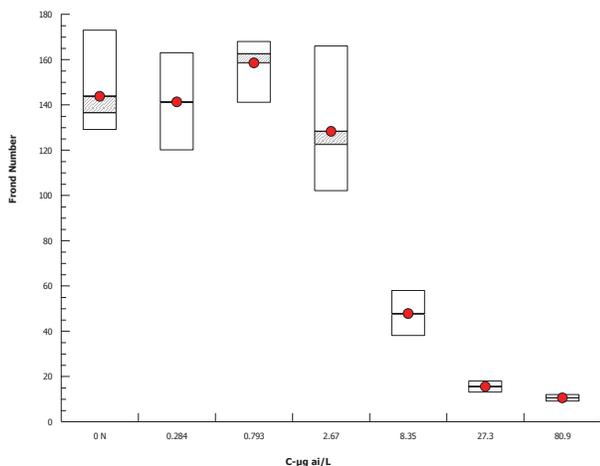
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	20.8	16.8	0.0020	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.952	0.897	0.2204	Normal Distribution

Frond Number Summary

C-µg ai/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	144	112	175	137	129	173	9.91	13.8%	0.0%
0.284		4	141	111	172	141	120	163	9.52	13.5%	1.74%
0.793		4	159	139	178	163	141	168	5.98	7.54%	-10.3%
2.67		4	128	85.3	171	123	102	166	13.5	21.0%	10.8%
8.35		4	47.8	29.8	65.7	47.5	38	58	5.63	23.6%	66.8%
27.3		4	15.5	10.9	20.1	15.5	13	18	1.44	18.6%	89.2%
80.9		4	10.5	8.45	12.6	10.5	9	12	0.645	12.3%	92.7%

Graphics



OCSPP 850.4400 Aquatic Vascular Plant

Wildlife International

<b>Analysis ID:</b> 18-8388-2003	<b>Endpoint:</b> Frond Number	<b>CETIS Version:</b> CETISv1.8.7
<b>Analyzed:</b> 04 Mar-17 6:16	<b>Analysis:</b> Nonparametric-Control vs Ord. Treatments	<b>Official Results:</b> Yes
<b>Batch ID:</b> 03-2473-9344	<b>Test Type:</b> Lemna Growth (7-d)	<b>Analyst:</b>
<b>Start Date:</b> 15 May-15	<b>Protocol:</b> OCSPP 850.4400 Aquatic Plant (Lemna)	<b>Diluent:</b> Algal Culture Media
<b>Ending Date:</b>	<b>Species:</b> Lemna Gibba	<b>Brine:</b>
<b>Duration:</b> NA	<b>Source:</b> US Dept. Agri.	<b>Age:</b>

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	2.67	8.35	4.722	

Jonckheere-Terpstra Step-Down Test

Control	vs	C-µg ai/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.284	9	NA	-2	0.8645	Exact		Non-Significant Effect
		0.793	-1.1	1.64	1	-2	0.8645	Asymp	Non-Significant Effect
		2.67	0.421	1.64	1	-2	0.3370	Asymp	Non-Significant Effect
		8.35*	2.43	1.64	2	-2	0.0076	Asymp	Significant Effect
		27.3*	3.86	1.64	4	-2	<0.0001	Asymp	Significant Effect
		80.9*	4.98	1.64	4	-2	<0.0001	Asymp	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	101168.7	16861.45	6	66.9	<0.0001	Significant Effect
Error	5290	251.9048	21			
Total	106458.7		27			

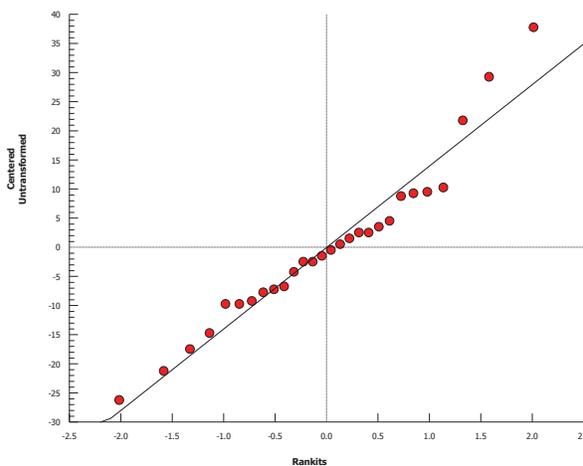
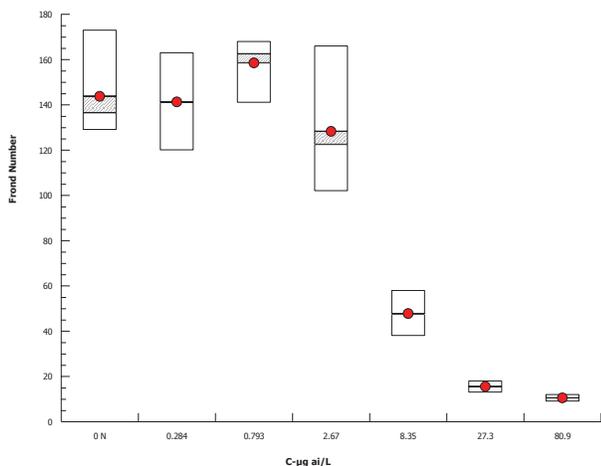
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	20.8	16.8	0.0020	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.952	0.897	0.2204	Normal Distribution

Frond Number Summary

C-µg ai/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	144	112	175	137	129	173	9.91	13.8%	0.0%
0.284		4	141	111	172	141	120	163	9.52	13.5%	1.74%
0.793		4	159	139	178	163	141	168	5.98	7.54%	-10.3%
2.67		4	128	85.3	171	123	102	166	13.5	21.0%	10.8%
8.35		4	47.8	29.8	65.7	47.5	38	58	5.63	23.6%	66.8%
27.3		4	15.5	10.9	20.1	15.5	13	18	1.44	18.6%	89.2%
80.9		4	10.5	8.45	12.6	10.5	9	12	0.645	12.3%	92.7%

Graphics



OCSPP 850.4400 Aquatic Vascular Plant

Wildlife International

<b>Analysis ID:</b> 01-7531-0230	<b>Endpoint:</b> Frond Weight	<b>CETIS Version:</b> CETISv1.8.7
<b>Analyzed:</b> 04 Mar-17 6:16	<b>Analysis:</b> Parametric-Control vs Treatments	<b>Official Results:</b> Yes
<b>Batch ID:</b> 03-2473-9344	<b>Test Type:</b> Lemna Growth (7-d)	<b>Analyst:</b>
<b>Start Date:</b> 15 May-15	<b>Protocol:</b> OCSPP 850.4400 Aquatic Plant (Lemna)	<b>Diluent:</b> Algal Culture Media
<b>Ending Date:</b>	<b>Species:</b> Lemna Gibba	<b>Brine:</b>
<b>Duration:</b> NA	<b>Source:</b> US Dept. Agri.	<b>Age:</b>

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	18.2%	2.67	8.35	4.722	

Dunnett Multiple Comparison Test

Control	vs	C-µg ai/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.284	-0.306	2.45	3.8	6	0.9240	CDF	Non-Significant Effect
		0.793	-1.71	2.45	3.8	6	0.9991	CDF	Non-Significant Effect
		2.67	0.403	2.45	3.8	6	0.7210	CDF	Non-Significant Effect
		8.35*	4.69	2.45	3.8	6	0.0003	CDF	Significant Effect
		27.3*	6.06	2.45	3.8	6	<0.0001	CDF	Significant Effect
		80.9*	7.2	2.45	3.8	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	728.0071	121.3345	6	25.2	<0.0001	Significant Effect
Error	101.1025	4.814405	21			
Total	829.1096		27			

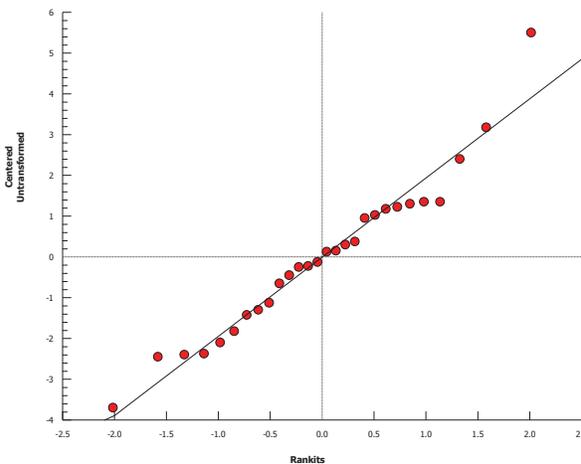
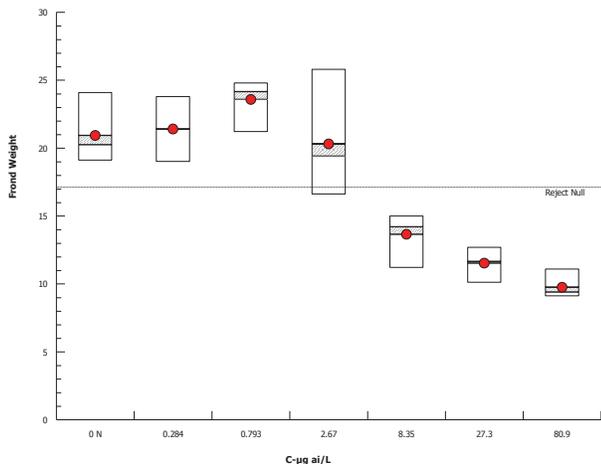
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.86	16.8	0.2483	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.964	0.897	0.4279	Normal Distribution

Frond Weight Summary

C-µg ai/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	20.9	17.4	24.5	20.3	19.1	24.1	1.11	10.6%	0.0%
0.284		4	21.4	17.9	24.9	21.4	19	23.8	1.11	10.4%	-2.27%
0.793		4	23.6	20.9	26.2	24.2	21.2	24.8	0.827	7.02%	-12.7%
2.67		4	20.3	13.9	26.7	19.4	16.6	25.8	2.01	19.8%	2.99%
8.35		4	13.7	10.9	16.4	14.2	11.2	15	0.854	12.5%	34.8%
27.3		4	11.5	9.79	13.3	11.6	10.1	12.7	0.545	9.46%	44.9%
80.9		4	9.75	8.29	11.2	9.4	9.1	11.1	0.457	9.38%	53.4%

Graphics



OCSPP 850.4400 Aquatic Vascular Plant

Wildlife International

<b>Analysis ID:</b> 14-4586-9607	<b>Endpoint:</b> Frond Weight	<b>CETIS Version:</b> CETISv1.8.7
<b>Analyzed:</b> 04 Mar-17 6:16	<b>Analysis:</b> Parametric-Control vs Ord.Treatments	<b>Official Results:</b> Yes
<b>Batch ID:</b> 03-2473-9344	<b>Test Type:</b> Lemna Growth (7-d)	<b>Analyst:</b>
<b>Start Date:</b> 15 May-15	<b>Protocol:</b> OCSPP 850.4400 Aquatic Plant (Lemna)	<b>Diluent:</b> Algal Culture Media
<b>Ending Date:</b>	<b>Species:</b> Lemna Gibba	<b>Brine:</b>
<b>Duration:</b> NA	<b>Source:</b> US Dept. Agri.	<b>Age:</b>

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	13.8%	2.67	8.35	4.722	

Williams Multiple Comparison Test

Control	vs	C-µg ai/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.284	-0.306	1.72	2.67	6	>0.05	CDF	Non-Significant Effect
		0.793	-1.01	1.8	2.8	6	>0.05	CDF	Non-Significant Effect
		2.67	0.403	1.83	2.84	6	>0.05	CDF	Non-Significant Effect
		8.35*	4.69	1.84	2.86	6	<0.05	CDF	Significant Effect
		27.3*	6.06	1.85	2.87	6	<0.05	CDF	Significant Effect
		80.9*	7.2	1.86	2.88	6	<0.05	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	728.0071	121.3345	6	25.2	<0.0001	Significant Effect
Error	101.1025	4.814405	21			
Total	829.1096		27			

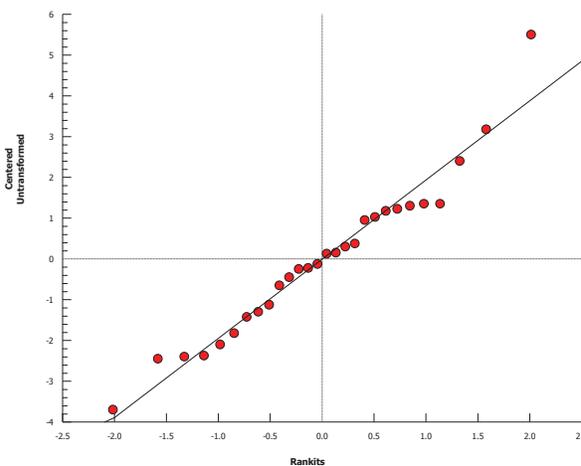
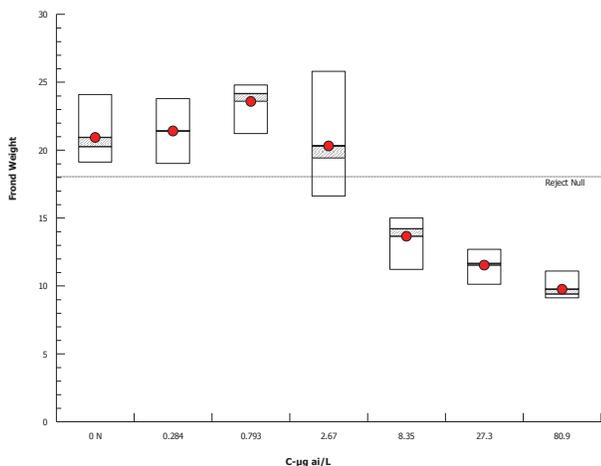
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.86	16.8	0.2483	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.964	0.897	0.4279	Normal Distribution

Frond Weight Summary

C-µg ai/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	20.9	17.4	24.5	20.3	19.1	24.1	1.11	10.6%	0.0%
0.284		4	21.4	17.9	24.9	21.4	19	23.8	1.11	10.4%	-2.27%
0.793		4	23.6	20.9	26.2	24.2	21.2	24.8	0.827	7.02%	-12.7%
2.67		4	20.3	13.9	26.7	19.4	16.6	25.8	2.01	19.8%	2.99%
8.35		4	13.7	10.9	16.4	14.2	11.2	15	0.854	12.5%	34.8%
27.3		4	11.5	9.79	13.3	11.6	10.1	12.7	0.545	9.46%	44.9%
80.9		4	9.75	8.29	11.2	9.4	9.1	11.1	0.457	9.38%	53.4%

Graphics



OCSPP 850.4400 Aquatic Vascular Plant

Wildlife International

<b>Analysis ID:</b> 02-9677-1758	<b>Endpoint:</b> Weight Growth Rate	<b>CETIS Version:</b> CETISv1.8.7
<b>Analyzed:</b> 04 Mar-17 6:16	<b>Analysis:</b> Parametric-Control vs Treatments	<b>Official Results:</b> Yes
<b>Batch ID:</b> 03-2473-9344	<b>Test Type:</b> Lemna Growth (7-d)	<b>Analyst:</b>
<b>Start Date:</b> 15 May-15	<b>Protocol:</b> OCSPP 850.4400 Aquatic Plant (Lemna)	<b>Diluent:</b> Algal Culture Media
<b>Ending Date:</b>	<b>Species:</b> Lemna Gibba	<b>Brine:</b>
<b>Duration:</b> NA	<b>Source:</b> US Dept. Agri.	<b>Age:</b>

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	6.95%	2.67	8.35	4.722	

Dunnett Multiple Comparison Test

Control	vs	C-µg ai/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.284	-0.272	2.45	0.027	6	0.9181	CDF	Non-Significant Effect
		0.793	-1.48	2.45	0.027	6	0.9970	CDF	Non-Significant Effect
		2.67	0.481	2.45	0.027	6	0.6888	CDF	Non-Significant Effect
		8.35*	5.13	2.45	0.027	6	0.0001	CDF	Significant Effect
		27.3*	7.07	2.45	0.027	6	<0.0001	CDF	Significant Effect
		80.9*	8.98	2.45	0.027	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04938793	0.008231321	6	34.3	<0.0001	Significant Effect
Error	0.00504673	0.0002403205	21			
Total	0.05443466		27			

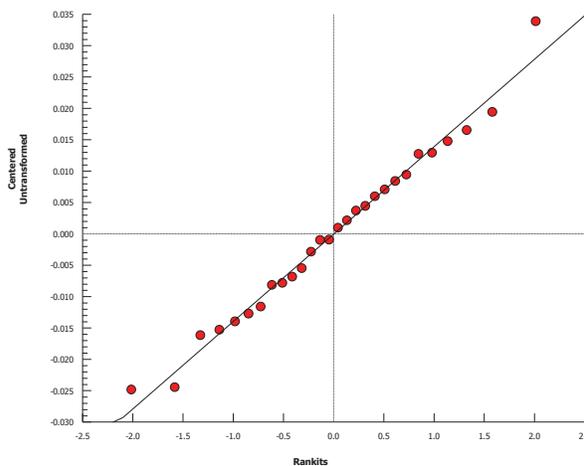
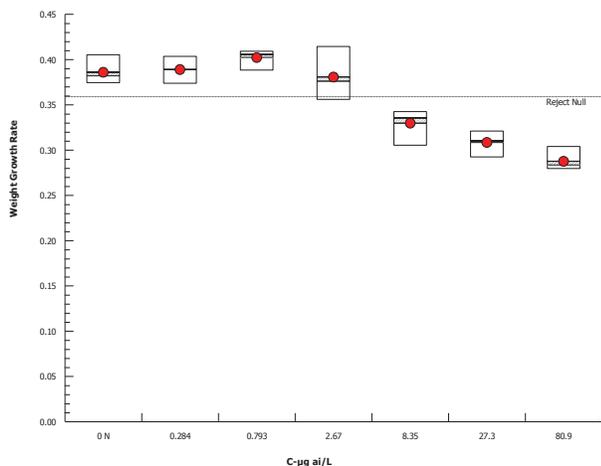
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.64	16.8	0.7248	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.985	0.897	0.9538	Normal Distribution

Weight Growth Rate Summary

C-µg ai/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.386	0.364	0.408	0.382	0.374	0.405	0.00683	3.54%	0.0%
0.284		4	0.389	0.367	0.411	0.389	0.374	0.404	0.00697	3.59%	-0.77%
0.793		4	0.402	0.387	0.418	0.406	0.388	0.409	0.00484	2.41%	-4.2%
2.67		4	0.381	0.34	0.421	0.376	0.356	0.414	0.0127	6.68%	1.37%
8.35		4	0.33	0.303	0.357	0.335	0.305	0.343	0.00846	5.13%	14.6%
27.3		4	0.308	0.289	0.328	0.31	0.292	0.321	0.00608	3.94%	20.1%
80.9		4	0.288	0.27	0.305	0.283	0.279	0.304	0.00561	3.91%	25.5%

Graphics



OCSPP 850.4400 Aquatic Vascular Plant

Wildlife International

<b>Analysis ID:</b> 09-6891-6119	<b>Endpoint:</b> Weight Growth Rate	<b>CETIS Version:</b> CETISv1.8.7
<b>Analyzed:</b> 04 Mar-17 6:16	<b>Analysis:</b> Parametric-Control vs Ord.Treatments	<b>Official Results:</b> Yes
<b>Batch ID:</b> 03-2473-9344	<b>Test Type:</b> Lemna Growth (7-d)	<b>Analyst:</b>
<b>Start Date:</b> 15 May-15	<b>Protocol:</b> OCSPP 850.4400 Aquatic Plant (Lemna)	<b>Diluent:</b> Algal Culture Media
<b>Ending Date:</b>	<b>Species:</b> Lemna Gibba	<b>Brine:</b>
<b>Duration:</b> NA	<b>Source:</b> US Dept. Agri.	<b>Age:</b>

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	5.27%	2.67	8.35	4.722	

Williams Multiple Comparison Test

Control	vs	C-µg ai/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.284	-0.272	1.72	0.019	6	>0.05	CDF	Non-Significant Effect
		0.793	-0.876	1.8	0.02	6	>0.05	CDF	Non-Significant Effect
		2.67	0.481	1.83	0.020	6	>0.05	CDF	Non-Significant Effect
		8.35*	5.13	1.84	0.020	6	<0.05	CDF	Significant Effect
		27.3*	7.07	1.85	0.020	6	<0.05	CDF	Significant Effect
		80.9*	8.98	1.86	0.020	6	<0.05	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04938793	0.008231321	6	34.3	<0.0001	Significant Effect
Error	0.00504673	0.0002403205	21			
Total	0.05443466		27			

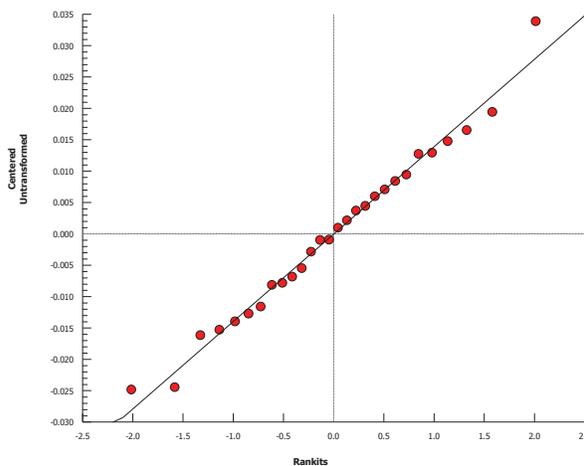
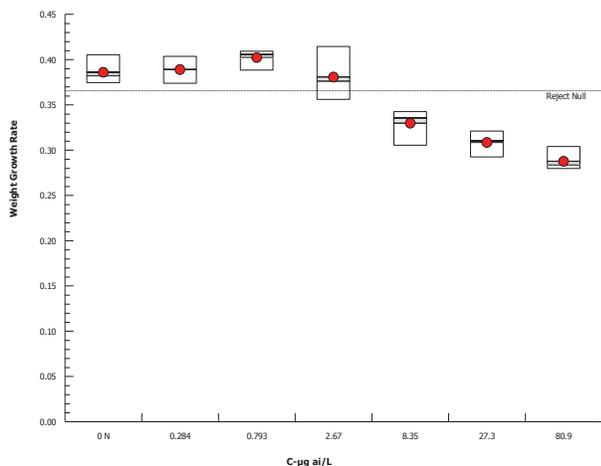
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.64	16.8	0.7248	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.985	0.897	0.9538	Normal Distribution

Weight Growth Rate Summary

C-µg ai/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.386	0.364	0.408	0.382	0.374	0.405	0.00683	3.54%	0.0%
0.284		4	0.389	0.367	0.411	0.389	0.374	0.404	0.00697	3.59%	-0.77%
0.793		4	0.402	0.387	0.418	0.406	0.388	0.409	0.00484	2.41%	-4.2%
2.67		4	0.381	0.34	0.421	0.376	0.356	0.414	0.0127	6.68%	1.37%
8.35		4	0.33	0.303	0.357	0.335	0.305	0.343	0.00846	5.13%	14.6%
27.3		4	0.308	0.289	0.328	0.31	0.292	0.321	0.00608	3.94%	20.1%
80.9		4	0.288	0.27	0.305	0.283	0.279	0.304	0.00561	3.91%	25.5%

Graphics



# CETIS Analytical Report

Report Date: 04 Mar-17 06:17 (p 1 of 8)  
 Test Code: 128994 49760107 | 12-3606-5414

## OCSPP 850.4400 Aquatic Vascular Plant

Wildlife International

<b>Analysis ID:</b> 00-4186-4891	<b>Endpoint:</b> Frond Number Growth Rate	<b>CETIS Version:</b> CETISv1.8.7
<b>Analyzed:</b> 04 Mar-17 6:16	<b>Analysis:</b> Nonlinear Regression	<b>Official Results:</b> Yes
<b>Batch ID:</b> 03-2473-9344	<b>Test Type:</b> Lemna Growth (7-d)	<b>Analyst:</b>
<b>Start Date:</b> 15 May-15	<b>Protocol:</b> OCSPP 850.4400 Aquatic Plant (Lemna)	<b>Diluent:</b> Algal Culture Media
<b>Ending Date:</b>	<b>Species:</b> Lemna Gibba	<b>Brine:</b>
<b>Duration:</b> NA	<b>Source:</b> US Dept. Agri.	<b>Age:</b>

### Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Cumulative Log-Normal EV [Y=A*(1- Φ(log(X/D)/C))]	None	None	Normal [W=1]	Off [Y*=Y]

### Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
10	88.6	-170	-167	0.9481	Yes	7.81	2.84	0.0005	Significant Lack of Fit

### Point Estimates

Level	µg ai/L	95% LCL	95% UCL
IC5	1.08	0.438	1.7
IC10	1.95	1.21	2.75
IC20	3.98	2.89	5.24
IC25	5.22	3.95	6.71
IC50	15.6	12.9	18.8

### Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	0.377	0.00913	0.359	0.394	41.2	<0.0001	Significant Parameter
C	1.62	0.164	1.3	1.94	9.92	<0.0001	Significant Parameter
D	15.6	1.8	12.1	19.1	8.65	<0.0001	Significant Parameter

### ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	0.362596	0.362596	1	495	<0.0001	Significant
Lack of Fit	0.010957	0.002739	4	7.81	0.0005	Significant
Pure Error	0.007366	0.000351	21			
Residual	0.018322	0.000733	25			

### Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	5.59	12.6	0.4712	Equal Variances
	Mod Levene Equality of Variance	1.52	2.57	0.2209	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.972	0.926	0.6455	Normal Distribution
	Anderson-Darling A2 Normality	0.287	2.49	0.6509	Normal Distribution

### Frond Number Growth Rate Summary

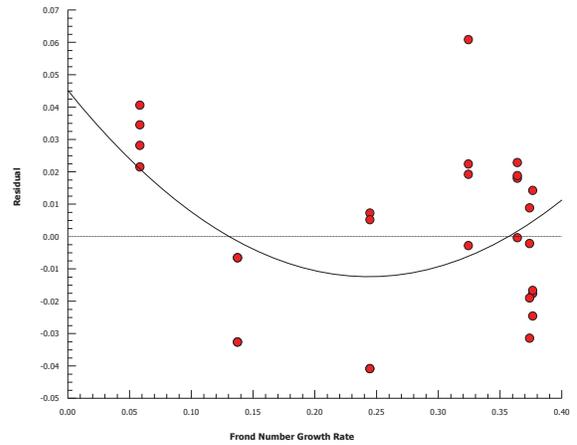
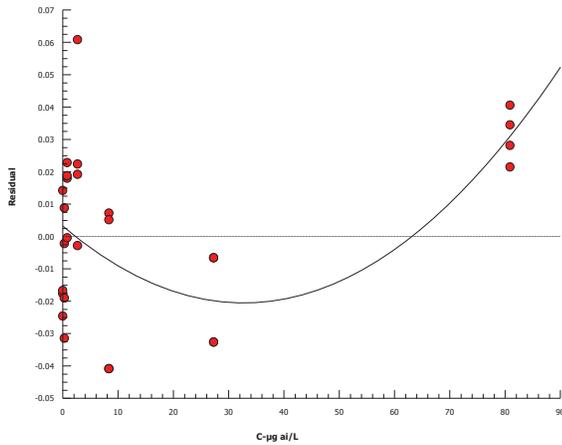
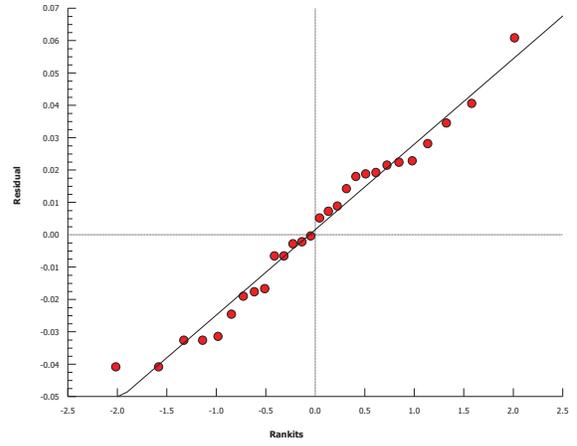
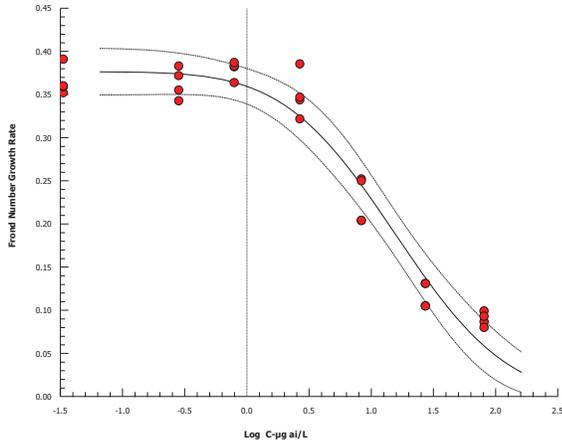
C-µg ai/L	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	0.365	0.352	0.391	0.00865	0.0173	4.73%	0.0%
0.284		4	0.363	0.343	0.383	0.00891	0.0178	4.91%	0.64%
0.793		4	0.379	0.364	0.387	0.00517	0.0103	2.73%	-3.68%
2.67		4	0.349	0.322	0.385	0.0132	0.0264	7.57%	4.39%
8.35		4	0.227	0.204	0.252	0.0136	0.0272	11.9%	37.8%
27.3		4	0.118	0.105	0.131	0.00752	0.015	12.8%	67.7%
80.9		4	0.0896	0.0799	0.099	0.0041	0.00821	9.16%	75.5%

Analysis ID: 00-4186-4891      Endpoint: Frond Number Growth Rate  
Analyzed: 04 Mar-17 6:16      Analysis: Nonlinear Regression

CETIS Version: CETISv1.8.7  
Official Results: Yes

Graphics

3P Cumulative Log-Normal EV [Y=A\*(1- Φ(log(X/D)/C))]



# CETIS Analytical Report

Report Date: 04 Mar-17 06:17 (p 3 of 8)  
 Test Code: 128994 49760107 | 12-3606-5414

## OCSPP 850.4400 Aquatic Vascular Plant

Wildlife International

<b>Analysis ID:</b> 07-5041-1149	<b>Endpoint:</b> Frond Number	<b>CETIS Version:</b> CETISv1.8.7
<b>Analyzed:</b> 04 Mar-17 6:16	<b>Analysis:</b> Nonlinear Regression	<b>Official Results:</b> Yes
<b>Batch ID:</b> 03-2473-9344	<b>Test Type:</b> Lemna Growth (7-d)	<b>Analyst:</b>
<b>Start Date:</b> 15 May-15	<b>Protocol:</b> OCSPP 850.4400 Aquatic Plant (Lemna)	<b>Diluent:</b> Algal Culture Media
<b>Ending Date:</b>	<b>Species:</b> Lemna Gibba	<b>Brine:</b>
<b>Duration:</b> NA	<b>Source:</b> US Dept. Agri.	<b>Age:</b>

### Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Cumulative Log-Normal EV [Y=A*(1- Φ(log(X/D)/C))]	None	None	Normal [W=1]	Off [Y*=Y]

### Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
11	-91.4	190	193	0.9285	Yes	1.74	2.84	0.1779	Non-Significant Lack of Fit

### Point Estimates

Level	µg ai/L	95% LCL	95% UCL
IC5	1.64	N/A	2.41
IC10	2.2	0.855	3.06
IC20	3.12	2.07	4.13
IC25	3.57	2.55	4.63
IC50	6.11	4.98	7.5

### Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	148	5	139	158	29.7	<0.0001	Significant Parameter
C	0.798	0.155	0.494	1.1	5.15	<0.0001	Significant Parameter
D	6.11	0.692	4.76	7.47	8.83	<0.0001	Significant Parameter

### ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	99410.75	99410.75	1	353	<0.0001	Significant
Lack of Fit	1757.963	439.4907	4	1.74	0.1779	Non-Significant
Pure Error	5290	251.9048	21			
Residual	7047.963	281.9185	25			

### Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	20.8	12.6	0.0020	Unequal Variances
	Mod Levene Equality of Variance	1.19	2.57	0.3504	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.965	0.926	0.4627	Normal Distribution
	Anderson-Darling A2 Normality	0.556	2.49	0.1552	Normal Distribution

### Frond Number Summary

C-µg ai/L	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	144	129	173	9.91	19.8	13.8%	0.0%
0.284		4	141	120	163	9.52	19	13.5%	1.74%
0.793		4	159	141	168	5.98	12	7.54%	-10.3%
2.67		4	128	102	166	13.5	27	21.0%	10.8%
8.35		4	47.8	38	58	5.63	11.3	23.6%	66.8%
27.3		4	15.5	13	18	1.44	2.89	18.6%	89.2%
80.9		4	10.5	9	12	0.645	1.29	12.3%	92.7%

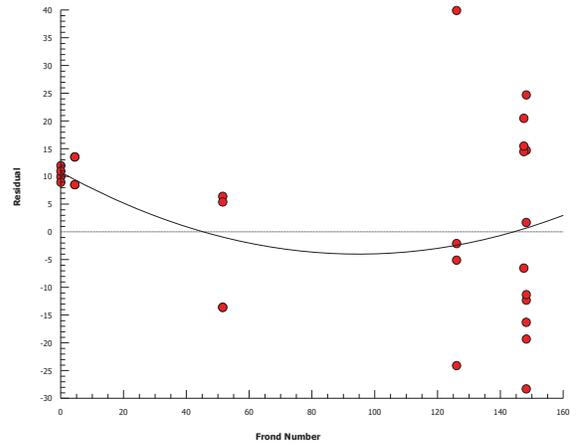
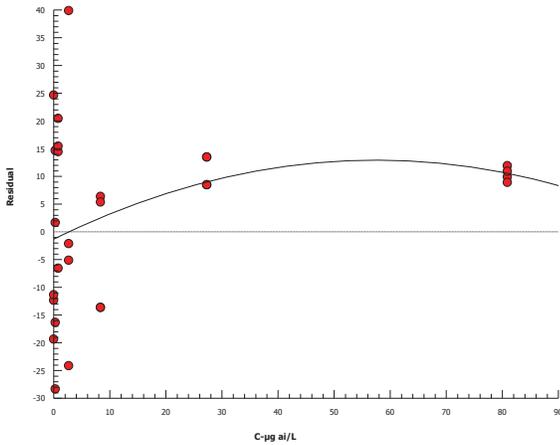
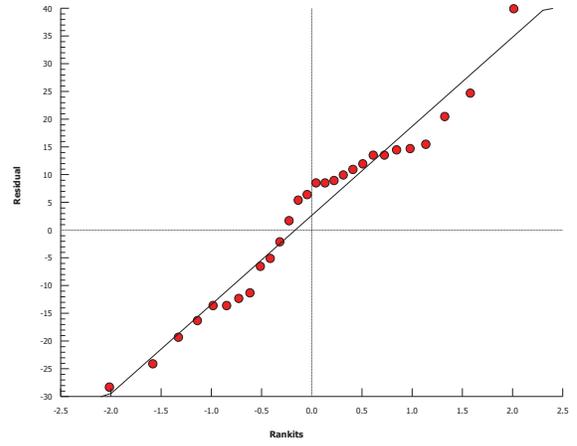
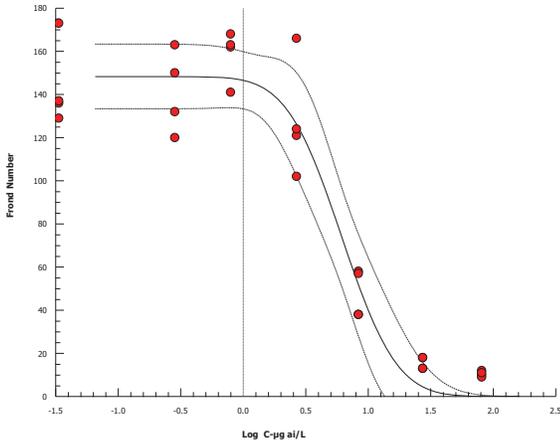
Analysis ID: 07-5041-1149  
Analyzed: 04 Mar-17 6:16

Endpoint: Frond Number  
Analysis: Nonlinear Regression

CETIS Version: CETISv1.8.7  
Official Results: Yes

Graphics

3P Cumulative Log-Normal EV [Y=A\*(1- Φ(log(X/D)/C))]



OCSPP 850.4400 Aquatic Vascular Plant

Wildlife International

<b>Analysis ID:</b> 19-6548-6692	<b>Endpoint:</b> Frond Weight	<b>CETIS Version:</b> CETISv1.8.7
<b>Analyzed:</b> 04 Mar-17 6:16	<b>Analysis:</b> Nonlinear Regression	<b>Official Results:</b> Yes
<b>Batch ID:</b> 03-2473-9344	<b>Test Type:</b> Lemna Growth (7-d)	<b>Analyst:</b>
<b>Start Date:</b> 15 May-15	<b>Protocol:</b> OCSPP 850.4400 Aquatic Plant (Lemna)	<b>Diluent:</b> Algal Culture Media
<b>Ending Date:</b>	<b>Species:</b> Lemna Gibba	<b>Brine:</b>
<b>Duration:</b> NA	<b>Source:</b> US Dept. Agri.	<b>Age:</b>

Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Cumulative Log-Normal EV [Y=A*(1- Φ(log(X/D)/C))]	None	None	Normal [W=1]	Off [Y*=Y]

Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
37	-39.9	86.8	89.8	0.7684	Yes	3.98	2.84	0.0147	Significant Lack of Fit

Point Estimates

Level	µg ai/L	95% LCL	95% UCL
IC5	0.641	N/A	1.76
IC10	1.56	0.419	3.34
IC20	4.59	2.17	8.31
IC25	6.92	3.71	11.7
IC50	36.1	22.8	57.3

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	22.3	1.07	20.2	24.4	21	<0.0001	Significant Parameter
C	2.45	0.521	1.43	3.47	4.7	<0.0001	Significant Parameter
D	36.1	10.1	16.4	55.8	3.59	0.0014	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	651.2873	651.2873	1	91.6	<0.0001	Significant
Lack of Fit	76.71984	19.17996	4	3.98	0.0147	Significant
Pure Error	101.1025	4.814405	21			
Residual	177.8223	7.112894	25			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	7.86	12.6	0.2483	Equal Variances
	Mod Levene Equality of Variance	1.32	2.57	0.2907	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.978	0.926	0.7978	Normal Distribution
	Anderson-Darling A2 Normality	0.268	2.49	0.7126	Normal Distribution

Frond Weight Summary

C-µg ai/L	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	20.9	19.1	24.1	1.11	2.22	10.6%	0.0%
0.284		4	21.4	19	23.8	1.11	2.23	10.4%	-2.27%
0.793		4	23.6	21.2	24.8	0.827	1.65	7.02%	-12.7%
2.67		4	20.3	16.6	25.8	2.01	4.02	19.8%	2.99%
8.35		4	13.7	11.2	15	0.854	1.71	12.5%	34.8%
27.3		4	11.5	10.1	12.7	0.545	1.09	9.46%	44.9%
80.9		4	9.75	9.1	11.1	0.457	0.915	9.38%	53.4%

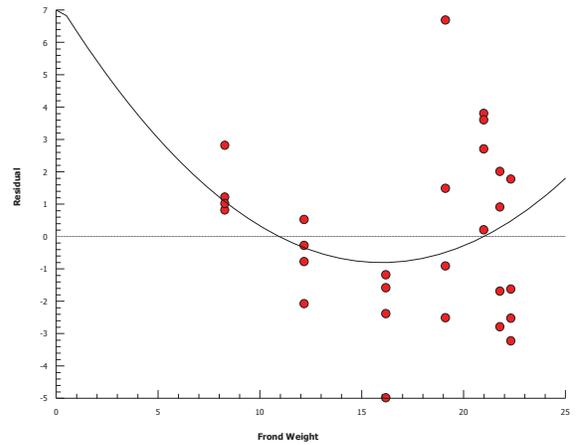
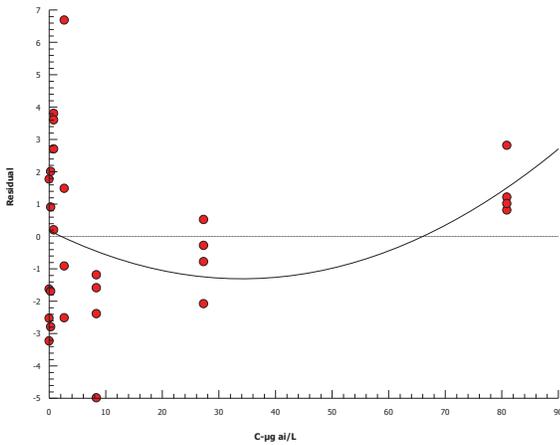
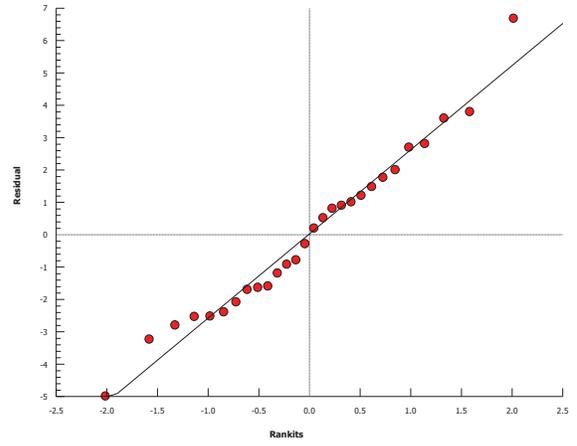
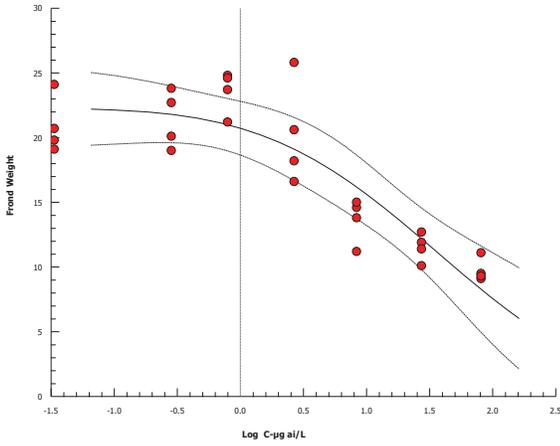
Analysis ID: 19-6548-6692  
Analyzed: 04 Mar-17 6:16

Endpoint: Frond Weight  
Analysis: Nonlinear Regression

CETIS Version: CETISv1.8.7  
Official Results: Yes

Graphics

3P Cumulative Log-Normal EV [Y=A\*(1- Φ(log(X/D)/C))]



# CETIS Analytical Report

Report Date: 04 Mar-17 06:17 (p 7 of 8)  
 Test Code: 128994 49760107 | 12-3606-5414

## OCSPP 850.4400 Aquatic Vascular Plant

Wildlife International

<b>Analysis ID:</b> 02-6803-9140	<b>Endpoint:</b> Weight Growth Rate	<b>CETIS Version:</b> CETISv1.8.7
<b>Analyzed:</b> 04 Mar-17 6:16	<b>Analysis:</b> Nonlinear Regression	<b>Official Results:</b> Yes
<b>Batch ID:</b> 03-2473-9344	<b>Test Type:</b> Lemna Growth (7-d)	<b>Analyst:</b>
<b>Start Date:</b> 15 May-15	<b>Protocol:</b> OCSPP 850.4400 Aquatic Plant (Lemna)	<b>Diluent:</b> Algal Culture Media
<b>Ending Date:</b>	<b>Species:</b> Lemna Gibba	<b>Brine:</b>
<b>Duration:</b> NA	<b>Source:</b> US Dept. Agri.	<b>Age:</b>

### Non-Linear Regression Options

Model Function	X Transform	Y Transform	Weighting Function	PTBS Function
3P Cumulative Log-Normal EV [Y=A*(1- Φ(log(X/D)/C))]	None	None	Normal [W=1]	Off [Y*=Y]

### Regression Summary

Iters	Log LL	AICc	BIC	Adj R2	Optimize	F Stat	Critical	P-Value	Decision(α:5%)
25	97.9	-189	-186	0.8127	Yes	4.57	2.84	0.0082	Significant Lack of Fit

### Point Estimates

Level	µg ai/L	95% LCL	95% UCL
IC5	1.54	0.502	3.18
IC10	5.57	2.9	9.43
IC20	26.5	18.5	36.9
IC25	47.9	33.1	67.8
IC50	524	198	1390

### Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
A	0.397	0.00813	0.381	0.413	48.8	<0.0001	Significant Parameter
C	3.55	0.675	2.22	4.87	5.25	<0.0001	Significant Parameter
D	524	238	56.6	991	2.2	0.0375	Significant Parameter

### ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	0.044994	0.044994	1	119	<0.0001	Significant
Lack of Fit	0.004394	0.001098	4	4.57	0.0082	Significant
Pure Error	0.005047	0.000240	21			
Residual	0.009441	0.000378	25			

### Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Variances	Bartlett Equality of Variance	3.64	12.6	0.7248	Equal Variances
	Mod Levene Equality of Variance	0.728	2.57	0.6321	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.986	0.926	0.9675	Normal Distribution
	Anderson-Darling A2 Normality	0.21	2.49	0.8984	Normal Distribution

### Weight Growth Rate Summary

C-µg ai/L	Control Type	Count	Calculated Variate						
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	0.386	0.374	0.405	0.00683	0.0137	3.54%	0.0%
0.284		4	0.389	0.374	0.404	0.00697	0.0139	3.59%	-0.77%
0.793		4	0.402	0.388	0.409	0.00484	0.00969	2.41%	-4.2%
2.67		4	0.381	0.356	0.414	0.0127	0.0254	6.68%	1.37%
8.35		4	0.33	0.305	0.343	0.00846	0.0169	5.13%	14.6%
27.3		4	0.308	0.292	0.321	0.00608	0.0122	3.94%	20.1%
80.9		4	0.288	0.279	0.304	0.00561	0.0112	3.91%	25.5%

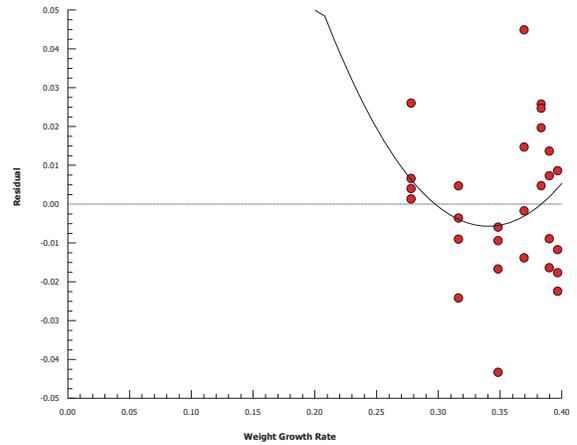
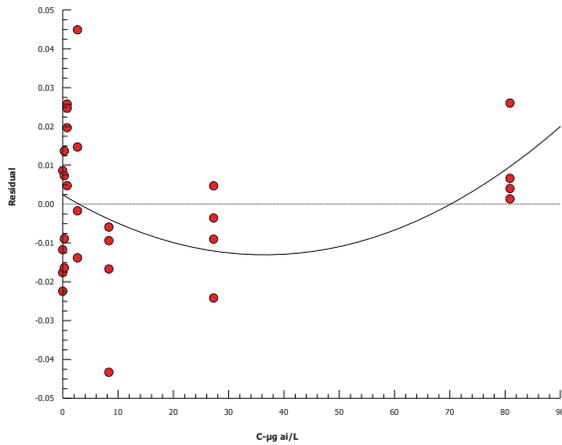
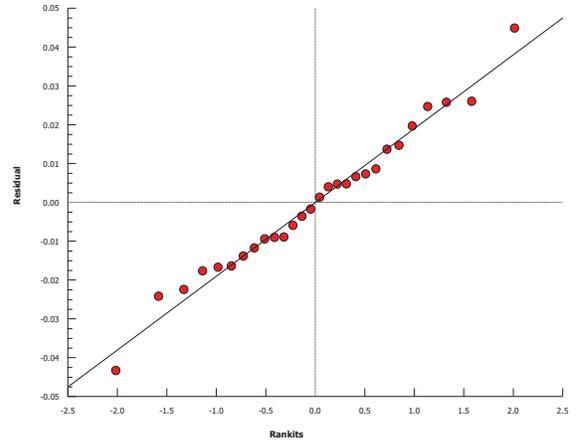
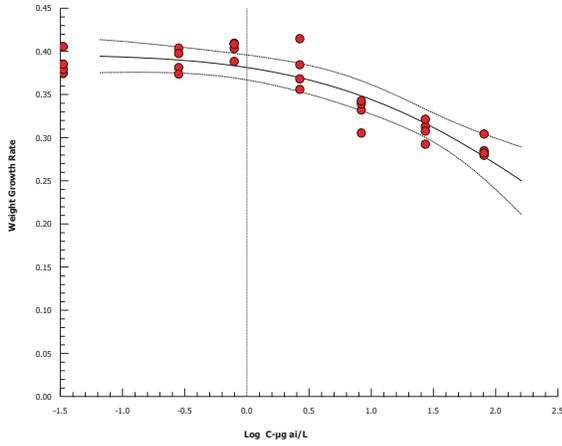
Analysis ID: 02-6803-9140  
Analyzed: 04 Mar-17 6:16

Endpoint: Weight Growth Rate  
Analysis: Nonlinear Regression

CETIS Version: CETISv1.8.7  
Official Results: Yes

Graphics

3P Cumulative Log-Normal EV [Y=A\*(1- Φ(log(X/D)/C))]



# CETIS Summary Report

Report Date: 04 Mar-17 06:18 (p 1 of 3)  
 Test Code: 128994 49760107 | 12-3606-5414

## OCSPP 850.4400 Aquatic Vascular Plant

Wildlife International

<b>Batch ID:</b> 03-2473-9344	<b>Test Type:</b> Lemna Growth (7-d)	<b>Analyst:</b>
<b>Start Date:</b> 15 May-15	<b>Protocol:</b> OCSPP 850.4400 Aquatic Plant (Lemna)	<b>Diluent:</b> Algal Culture Media
<b>Ending Date:</b>	<b>Species:</b> Lemna Gibba	<b>Brine:</b>
<b>Duration:</b> NA	<b>Source:</b> US Dept. Agri.	<b>Age:</b>

<b>Sample ID:</b> 09-3933-8103	<b>Code:</b> 128994 49760107	<b>Client:</b> CDM Smith - D. Worcester
<b>Sample Date:</b> 15 May-15	<b>Material:</b> Dithiopyr	<b>Project:</b>
<b>Receive Date:</b>	<b>Source:</b> Dow AgroSciences	
<b>Sample Age:</b> NA	<b>Station:</b>	

### Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
18-8388-2003	Frond Number	2.67	8.35	4.722	NA		Jonckheere-Terpstra Step-Down Test
12-1288-8000	Frond Number	2.67	8.35	4.722	15.2%		Mann-Whitney U Two-Sample Test
04-0461-3971	Frond Number Growth Rate	2.67	8.35	4.722	8.87%		Dunnett Multiple Comparison Test
03-9920-3164	Frond Number Growth Rate	2.67	8.35	4.722	6.72%		Williams Multiple Comparison Test
01-7531-0230	Frond Weight	2.67	8.35	4.722	18.2%		Dunnett Multiple Comparison Test
14-4586-9607	Frond Weight	2.67	8.35	4.722	13.8%		Williams Multiple Comparison Test
02-9677-1758	Weight Growth Rate	2.67	8.35	4.722	6.95%		Dunnett Multiple Comparison Test
09-6891-6119	Weight Growth Rate	2.67	8.35	4.722	5.27%		Williams Multiple Comparison Test

### Point Estimate Summary

Analysis ID	Endpoint	Level	µg ai/L	95% LCL	95% UCL	TU	Method
07-5041-1149	Frond Number	IC5	1.64	N/A	2.41		Nonlinear Regression
		IC10	2.2	0.855	3.06		
		IC20	3.12	2.07	4.13		
		IC25	3.57	2.55	4.63		
		IC50	6.11	4.98	7.5		
00-4186-4891	Frond Number Growth Rat	IC5	1.08	0.438	1.7		Nonlinear Regression
		IC10	1.95	1.21	2.75		
		IC20	3.98	2.89	5.24		
		IC25	5.22	3.95	6.71		
		IC50	15.6	12.9	18.8		
19-6548-6692	Frond Weight	IC5	0.641	N/A	1.76		Nonlinear Regression
		IC10	1.56	0.419	3.34		
		IC20	4.59	2.17	8.31		
		IC25	6.92	3.71	11.7		
		IC50	36.1	22.8	57.3		
02-6803-9140	Weight Growth Rate	IC5	1.54	0.502	3.18		Nonlinear Regression
		IC10	5.57	2.9	9.43		
		IC20	26.5	18.5	36.9		
		IC25	47.9	33.1	67.8		
		IC50	524	198	1390		

# CETIS Summary Report

Report Date: 04 Mar-17 06:18 (p 2 of 3)  
 Test Code: 128994 49760107 | 12-3606-5414

OCSPP 850.4400 Aquatic Vascular Plant

Wildlife International

## FronD Number Summary

C-µg ai/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	144	112	175	129	173	9.91	19.8	13.8%	0.0%
0.284		4	141	111	172	120	163	9.52	19	13.5%	1.74%
0.793		4	159	139	178	141	168	5.98	12	7.54%	-10.3%
2.67		4	128	85.3	171	102	166	13.5	27	21.0%	10.8%
8.35		4	47.8	29.8	65.7	38	58	5.63	11.3	23.6%	66.8%
27.3		4	15.5	10.9	20.1	13	18	1.44	2.89	18.6%	89.2%
80.9		4	10.5	8.45	12.6	9	12	0.645	1.29	12.3%	92.7%

## FronD Number Growth Rate Summary

C-µg ai/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	0.365	0.338	0.393	0.352	0.391	0.00865	0.0173	4.73%	0.0%
0.284		4	0.363	0.335	0.391	0.343	0.383	0.00891	0.0178	4.91%	0.64%
0.793		4	0.379	0.362	0.395	0.364	0.387	0.00517	0.0103	2.73%	-3.68%
2.67		4	0.349	0.307	0.391	0.322	0.385	0.0132	0.0264	7.57%	4.39%
8.35		4	0.227	0.184	0.271	0.204	0.252	0.0136	0.0272	11.9%	37.8%
27.3		4	0.118	0.0939	0.142	0.105	0.131	0.00752	0.015	12.8%	67.7%
80.9		4	0.0896	0.0766	0.103	0.0799	0.099	0.0041	0.00821	9.16%	75.5%

## FronD Weight Summary

C-µg ai/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	20.9	17.4	24.5	19.1	24.1	1.11	2.22	10.6%	0.0%
0.284		4	21.4	17.9	24.9	19	23.8	1.11	2.23	10.4%	-2.27%
0.793		4	23.6	20.9	26.2	21.2	24.8	0.827	1.65	7.02%	-12.7%
2.67		4	20.3	13.9	26.7	16.6	25.8	2.01	4.02	19.8%	2.99%
8.35		4	13.7	10.9	16.4	11.2	15	0.854	1.71	12.5%	34.8%
27.3		4	11.5	9.79	13.3	10.1	12.7	0.545	1.09	9.46%	44.9%
80.9		4	9.75	8.29	11.2	9.1	11.1	0.457	0.915	9.38%	53.4%

## Weight Growth Rate Summary

C-µg ai/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	0.386	0.364	0.408	0.374	0.405	0.00683	0.0137	3.54%	0.0%
0.284		4	0.389	0.367	0.411	0.374	0.404	0.00697	0.0139	3.59%	-0.77%
0.793		4	0.402	0.387	0.418	0.388	0.409	0.00484	0.00969	2.41%	-4.2%
2.67		4	0.381	0.34	0.421	0.356	0.414	0.0127	0.0254	6.68%	1.37%
8.35		4	0.33	0.303	0.357	0.305	0.343	0.00846	0.0169	5.13%	14.6%
27.3		4	0.308	0.289	0.328	0.292	0.321	0.00608	0.0122	3.94%	20.1%
80.9		4	0.288	0.27	0.305	0.279	0.304	0.00561	0.0112	3.91%	25.5%

# CETIS Summary Report

Report Date: 04 Mar-17 06:18 (p 3 of 3)  
Test Code: 128994 49760107 | 12-3606-5414

OCSPP 850.4400 Aquatic Vascular Plant

Wildlife International

## FronD Number Detail

C-µg ai/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	173	129	136	137
0.284		163	132	120	150
0.793		141	162	163	168
2.67		121	166	124	102
8.35		38	58	57	38
27.3		18	18	13	13
80.9		10	12	9	11

## FronD Number Growth Rate Detail

C-µg ai/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.391	0.352	0.359	0.36
0.284		0.383	0.355	0.343	0.372
0.793		0.364	0.382	0.383	0.387
2.67		0.344	0.385	0.347	0.322
8.35		0.204	0.252	0.25	0.204
27.3		0.131	0.131	0.105	0.105
80.9		0.0866	0.099	0.0799	0.0929

## FronD Weight Detail

C-µg ai/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	24.1	19.1	19.8	20.7
0.284		23.8	20.1	19	22.7
0.793		21.2	24.8	23.7	24.6
2.67		20.6	25.8	18.2	16.6
8.35		13.8	14.6	15	11.2
27.3		11.9	12.7	11.4	10.1
80.9		9.1	9.5	9.3	11.1

## Weight Growth Rate Detail

C-µg ai/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.405	0.374	0.379	0.385
0.284		0.404	0.381	0.374	0.397
0.793		0.388	0.409	0.403	0.408
2.67		0.384	0.414	0.368	0.356
8.35		0.332	0.339	0.343	0.305
27.3		0.313	0.321	0.307	0.292
80.9		0.279	0.285	0.282	0.304